REMARKS/AMENDMENTS

Claims 1, 2, 4-6, 8-12, 14, 16-17, and 19-20 are pending in the Application. Claims 13, 15, and 18 have been canceled. All pending claims have been editorially amended. The support for non-editorial amendments to Claims 1, 2, 5, 11, 14 and 16 can be found in the Specification as follows: "having a BET surface area of from 5 to 600 m^2/g" in Claim 1 (Spec., p. 4, ll. 7-10); steam "having a temperature of from 100°C to 500°C" in Claim 1 (Spec., p. 5, ll. 7-9); temperature difference . . . is "from 20°C to 150°C" in Claim 1 (Spec., p. 4, ll. 16-20); "the maximum temperature in the column is in the lower part of the column" in Claim 1 (Spec., pp. 6-7, Examples 1 and 6); "the maximum temperature in the column is from 150°C to 500°C" in Claim 1 (Spec., p. 4, ll. 27-30); "50°C to 100°C" in Claim 2 (Spec., p. 4, ll. 19-20); "100°C to 250°C" in Claim 5 (Spec., p. 4, l. 32, to p. 5, l. 2); "350°C to 450°C" in Claim 11 (Spec., p. 4, ll. 29-30); and "wherein the steam entering the column has a temperature from 120°C to 200°C" in Claims 14 and 16 (Spec., p. 5, ll. 7-9).

No new matter has been added.

Objection to Claims 13, 15, and 18

Claims 13, 15, and 18 have been canceled. Accordingly, the Examiner's objections that Claims 13, 15, and 18 depend from canceled Claim 3 (Office Action dated April 13, 2009 (OA), page 2) should be moot.

Rejection under 35 U.S.C. 112, 1st ¶ (written description)

Claims 1-2, 4-6, 8-12, 14, 16-17, and 19-20 are rejected under 35 U.S.C. 112, 1st ¶, because the Examiner finds no support in the Specification as originally filed for the phrase "a maximum temperature of 150°C prevails in the column" in previously presented Claim 1 (OA, pp. 2-3). The rejection should be moot because the claims have been amended to replace the criticized phrase with "the maximum temperature in the column is from 150°C to

500°C" which is expressly supported in the Specification at page 4, line 29, and original Claim 3. Accordingly, the rejections under 35 U.S.C. 112, 1st ¶, should be withdrawn.

Rejections under 35 U.S.C. 103 over GB'271 in view of Mangold

Claims 1-2, 4-6, 8-12, 14, 16-17, and 19-20 are rejected under 35 U.S.C. 103 over GB'271 (UK 1,197,271, published July 1, 1970) in view of Mangold (U.S. Patent 6,328, 944 B1, issued December 11, 2001)(OA, p.3). The rejection should be withdrawn.

The Examiner relies on Mangold for its teaching in Table 2 that silicon dioxides produced by flame hydrolysis, i.e., silicas of the kind reported in Example 1 of GB'271, have densities in the range of 25-32 g/L and thus have "a residence time of 2.9--3.7 minutes, according to the reaction parameters in GB'271 Example 1" (OA, p. 4). Moreover, the Examiner concludes that it would have been obvious to treat silicon dioxide particles described by Mangold by the process described in GB'271 (OA, p. 5, 1st ¶). For purposes of this response, Applicant will presume that the metal oxide particles treated by the process GB'271 describes have a residence time of more than 5 seconds and less than 5 minutes in the vertical tube treatment zone GB'271 describes in its Example 1. Accordingly, the sole issue presented to the Examiner is whether the process Applicant currently claims would have been obvious to a person having ordinary skill in the art in view of processes described in GB'271 wherein finely divided metal oxide particles (BET surface area about 200 m^2/g) containing residues of halide compounds are presumed to have a residence time of more than 5 seconds and less than 5 minutes in its vertical tube treatment zone. Applicant maintains that GB'271 does not establish that the process Applicant claims otherwise would have been prima facie obvious to a person having ordinary skill in the art in view of the GB'271 teachings considered as a whole.

GB'271 reasonably would have taught persons having ordinary skill in the art that (1) the finely divided metal oxide particles containing residues of halide compounds are applied,

together with reaction gases, to the upper part of an upright column and migrate downwards through the column due to gravity, (2) the maximum temperature in the column is from 400°C to 600°C, and (3) there is no significant temperature difference between the lower part and the upper part of the column. The process Applicant claims requires that (A) the finely divided metal oxide particles containing residues of halide compounds are applied, together with reaction gases, to the upper part of an upright column and migrate downwards through the column due to gravity, (B) the maximum temperature in the column is in the lower part of the column, (C) the maximum temperature in the column is from 150 to 500°C, and (D) there is a temperature difference of from 20 to 150°C between the lower part and the upper part of the column. According to the teaching of GB'271, the prior art processes it describes in GB'271 wherein warm moist air or steam is fed to a stationary or upward moving fluidized bed of metal oxide particles from the bottom part of the column having a requisite temperature of 450 to 800°C or parallel fed together with the metal oxide particles from the bottom part of the column (GB, p. 1, l. 70, to p. 2, l. 26) do not anticipate and would not have reasonably suggested the new process GB'271 describes and would not have reasonably have suggested the improved process Applicant claims.

Moreover, while GB'271 recognizes that the previously described and other "deacidification [processes]. . . carried out by heat treatment at temperatures in the range from 200 to 500°C. with moist air in a rotating tube or in screw conveyors or on an endless steel belt" (GB'271, p. 1, ll. 60-64) are well-known in the art, none of the prior art processes discussed in GB'271, including processes where "highly dispersed oxides are purified by introducing the oxides into the upper chamber of a vertical shaft furnace . . . divided . . . by gas-permeable trays or plates, in countercurrent to a hot flow of steam introduced into the lowermost chamber" and the overflow oxides from the trays or plates are discharged below (GB'271, p. 2, ll. 27-55), is said to suggest the invention GB'271 discloses. GB'271 states

that its inventive process is patentably distinct from any of the prior art processes it discusses (GB'271, p. 2, ll. 73-109).

GB'271 teaches (GB'271, p. 2, ll. 56-72):

> The present invention provides a process for purifying finely divided oxides . . . of metals and/or silicon obtained by reacting chlorides of these metals and/or silicon at elevated temperatures in the gas phase with hydrolytic or oxidizing gases, wherein the oxide . . . is introduced into a treatment zone heated to 400 to 600°C., in which it descends under gravity in countercurrent to an ascending stream of a mixture of steam and a gas which is inert to the oxide, the stream being preferably preheated to about 120°C., the rate of flow of the gas phase being kept at a level low enough to prevent the finely divided oxide from forming a fluidized bed.

The important features of the GB'271 invention are:

(1) the metal oxide is "introduced into a treatment zone heated to 400 to 600°C" (GB'271, p. 2, ll. 63-64);

(2) the maximum temperature in the treatment zone is in the upper part of the treatment zone where the metal oxide is introduced because "the temperature of 400-600°C is maintained inside the treatment zone" (GB'271, p. 3, ll. 31-33 and 80-82);

(3) GB'127 does not teach or reasonably suggest that the temperature of the upper part of the treatment zone where the metal oxide is introduced may be from 20 to 150°C lower than the temperature of the lower part of the treatment zone where the metal oxide are removed;

(4) GB'127 does not teach or reasonably suggest that the temperature of the upper part of the treatment zone where the metal oxide is introduced is from 50 to 100°C lower than the temperature of the lower part of the treatment zone where the metal oxide are removed; and

(5) GB'127 does not teach or reasonably suggest that the temperature of the upper part of the treatment zone where the metal oxide is introduced is from 50 to 100°C lower than the temperature of the lower part of the treatment zone where the metal

oxide are removed when the maximum temperature in the lower part of the treatment zone is in the range of from 350 to 450°C.

In accordance with its invention, GB'127 teaches (GB'271, p. 2, ll. 96-100), "The temperature required for treatment was reduced from the 600-800°C. commonly used in the fluidized bed process, to from 400 to 600°C. in the vertical tube process." GB'271 teaches that there are many significant advantages of its vertical-tube countercurrent process wherein the temperature required for treatment was reduced from the 600-800°C. to from 400 to 600°C., including greater economy of energy, less thermal stress on the apparatus, service life of the apparatus, improved deacidification, more uniform results, and more reliable operation of the apparatus (GB'271, p. 2, ll. 110-128).

GB'271 teaches that the "treatment temperature may be maintained by means of an externally mounted electrical resistance heating system or alternatively by an internal heating system in which hydrogen is burnt in two vertically adjacent burners at the lower end of the treatment zone" (GB'271, p. 3, ll. 8-17). Significantly, in its Example 1, GB'271 teaches (GB'271, p. 3, ll. 31-35), "A temperature of 400-600°C., is maintained inside the treatment zone by means of an externally mounted electrical resistance heating system (heating coils in quartz tubes)." In its Example 2, GB'271 teaches (GB'271, p. 3, ll. 80-82), "A temperature of 400-600°C., is maintained inside the treatment zone." In its Example 3, GB'271 teaches (GB'271, p. 3, ll. 94-96; emphasis added), "The treatment zone is <u>externally heated to 600°C.</u>, by means of an electrical resistance heating system." In its Example 4, GB'271 teaches (GB'271, p. 3, ll. 109-120; emphasis added), "The treatment zone is <u>internally heated by the combustion of hydrogen in two vertically adjacent burners in the lower end of the treatment zone</u>. . . . The <u>temperature of the combustion gases, nitrogen and steam, ascending through the treatment zone, is about 600°C.</u>"

Persons having ordinary skill in the art would have learned from the teachings of GB'271 considered as a whole that a temperature of 400-600°C is maintained throughout the treatment zone of the vertical-tube used in the vertical-tube countercurrent processes of Examples 1 and 2 of GB'271. Persons having ordinary skill in the art would have learned from the teachings of GB'271 that a temperature of about 600°C is maintained throughout the treatment zone of the vertical-tube used in the vertical-tube countercurrent processes of Examples 3 and 4 of GB'271 whether employing an external (Example 3) or an internal (Example 4) heating system having two burners at the lower end of the treatment zone. Persons having ordinary skill in the art would have learned from Example 4 of GB'271 that the temperature of the steam and all gases "ascending through the treatment zone, is about 600°C." (GB'271, p. 3, ll. 118-119). Accordingly, persons having ordinary skill in the art would have understood from the teachings of GB'271 as a whole that the temperature of all gases ascending from the lower part of the column through the upper part of the column is maintained at the same or substantially the same temperature throughout the treatment zone. There is no evidence of record to the contrary.

Accordingly, there is no teaching or reasonable suggestion in GB'271 that there is or should be a difference of from 20 to 150°C between the lower part and the upper part of the column GB'271 employs. Furthermore, it is unreasonable to presume, as the Examiner appears to have done, that the metal oxide particles entering the upper part of the GB'271 column would or should be subjected to a temperature of from 20-150°C lower than the temperature in the lower part of the column where they are removed. All aspects of the teaching of GB'271 reasonably would have led persons having ordinary skill in the art to understand that a relatively constant temperature of 400-600°C is maintained throughout the treatment zone during the vertical-tube countercurrent process GB'271 describes.

The Examiner has indicated that heat treatment temperatures in the treatment zone anywhere in a range from 200 to 500°C would have been obvious to a person having ordinary skill in the art in view of the GB'271 teaching at page 1, lines 60-69, relative to other prior art processes (OA, pp. 5-6, bridging ¶). The Examiner's suggestion that the feasibility of using lower treatment temperatures in distinct rotating tube processes, screw conveyor processes, and endless steel belt processes would have led persons having ordinary skill in the art to further reduce the temperature of the treatment zone of the vertical-tube countercurrent process described by GB'271 from 400-600°C to 200-500°C is unreasonable. GB'271 clearly was interested in conserving energy. Nevertheless, GB'271 did not advise persons having ordinary skill in the art to further reduce the treatment zone temperature below 400-600°C. Moreover, lowering the maximum temperature in the treatment zone reasonably would not have led persons having ordinary skill in the art to keep the temperature in the lower part of the treatment zone at least 20°C higher than the temperature in the upper part of the treatment zone.

The Examiner argues that it would have been within the ordinary skill of the artisan to optimize the maximum temperature in the treatment zone, optimize the temperature differential between the upper and lower parts of the treatment zone, and determine those parts of the treatment zone which should have the maximum temperature without undue experimentation in view of the teaching of GB'271. First, a parameter must be recognized as a result-effective variable before the determination of the optimum parameter or the most effective system can be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618 (CCPA 1977). Here, GB'271 does not teach or reasonably suggest that temperature differences between the upper and lower parts of a vertical-tube countercurrent deacidification zone are desirable or that the location of the maximum temperature in the treatment zone has any import or significance. Scientists are generally motivated to improve

upon known variables. *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003). Also, here GB'271 would have led persons having ordinary skill in the art to understand that the metal oxide particles are "introduced into a treatment zone heated to 400 to 600°C" (GB'271, p. 2, ll. 56-64; emphasis added).

The Examiner is asked to separately consider Claim 11 where the maximum temperature is 350-450°C in the lower part of the column and the temperature difference between the lower and the upper parts of the column is from 50 to 100°C. Persons having ordinary skill in the art would have recognized that it would have been difficult, if not practically impossible, to maintain a temperature from 400-600°C in a treatment column with a temperature differential of 50-100°C between the lower and upper parts of the column when the maximum temperature in the lower part of the column is 350-450°C.

Furthermore, in the Table at page 8 of the Specification, Applicant shows that greater deacidification is achieved using a countercurrent process than is achieved using a parallel current process (See comparative Example 3). In addition, Example 2 shows that SiO_2 particles deacidified in accordance with Applicant's claimed process have an improved thickening effect on the viscosity of polymeric compositions than SiO_2 particles deacidified in a column maintained at a temperature of about 670°C with no more than 10°C temperature differential between the upper and lower parts of the column. This unexpected benefit could not have been predicted from GB'271 or any other prior art of record.

Finally, the Examiner argues that persons having ordinary skill in the art reasonably would have understood that deacidification could be further improved by passing once-treated metal oxide particles through multiple treatment columns. GB'271 does not suggest that further purification would be achieved using multiple treatment columns and shortened residence times in each. Where efficiency and conservation of energy are important, as GB'271 indicates, persons having ordinary skill in the art do not take unnecessary additional

temperature treatment steps without any recognized benefit or reasonable expectation of success. GB'271 is silent on the matter.

For the reasons stated herein, Applicant's claims are patentable over the applied prior art and in condition for allowance. Early notice of allowance is respectfully requested.

Respectfully submitted,

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